SOLAR PHOTOVOLTAIC (PV) MAXIMUM POWER POINT TRACKER (MPPT)USING VARIABLE STEP SIZE PERTURB AND OBSERVE (P&O) ALGORITHM

OMER JAMAL ELDIN IBRAHIM MOHAMMED

A project report submitted in partial fulfillment of the
requirements for the award of the degree of
Master of Engineering (Electrical-Power)

Faculty of Electrical Engineering
Universiti Teknologi Malaysia

JUNE 2014

This project report is dedicated to my parents for their endless support and encouragement.

ACKNOWLEDGEMENT

First and foremost, I would like to express heartfelt gratitude to my supervisor **Assos**. **Prof. Dr. Awang Bin Jusoh** for his constant support during my study at UTM. He inspired me greatly to work in this project. His willingness to motivate me contributed tremendously to this project. I have learned a lot from him and I am fortunate to have him as my mentor and supervisor.

Besides, I would like to thank the authority of Universiti Teknologi Malaysia (UTM) for providing me with a good environment and facilities.

ABSTRACT

Photovoltaic PV solar known for the low energy convergence efficiency when compared to other types of energy sources. Since PV Solar have nonlinear characteristic, it gives its maximum output at the Maximum Power Point MPP. This point affected by sun irradiation, temperature and the degree of the sun irradiance. It economically essential to utilize the maximum output of PV solar. Hence, a proper Maximum Power Point Tracking (MPPT) can achieve this task under fast weather variation. In this project, modified Perturb and Observe (P&O) or more commonly known as variable step size P&O method was introduced and implemented throughout the project to overcome the common drawbacks of conventional P&O method as solar irradiation changes. The operation of the entire solar MPPT system was observed through theoretical approaches using MATLAB/Simulink simulation. The system was further explored with the inclusion of surrounding temperature. Double diode modeling circuit will be used for higher accuracy and efficiency.

ABSTRAK

Tenaga solar fotovoltan (PV) dikenali mempunyai kecekapan penukaran tenaga yang rendah berbanding dengan sumber tenaga yang lain. Fotovoltan solar mempunyai cirian tidak linar, di mana ia boleh membekalkan kuasa maksima, bilamana ia beroperasi pada satu titik kuasa maksima (MPP). Titik ini dipengaruhi oleh kadar sinaran matahari, suhu dan juga darjah terjahan matahari. Oleh sebab itu, kajian ini telah dilaksanakan bagi merekabentuk sebuah litar pengesan titik kuasa maksima terhadap sumber tenaga fotovoltan bagi keadaan sinaran matahari dan juga perubahan suhu yang tidak tetap. Kajian ini menggunakan kaedah ubahsuai P&O atau P&O langkah saiz boleh ubah bagi mengatasi kelemahan kaedah lazim P&O bila mana berlaku perubahan pada sinaran matahari dan perubahan suhu. Operasi keseluruhan dan prestasi rekabentuk sistem P&O telah dikaji menggunakan pendekatan teori serta simulasi MATLAB/Simulink. Sumber fotovoltan solar telah dimodelkan secara diod kembar bagi tujuan ketepatan dan kecekapan yang lebih baik.